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ABSTRACT

The application of Planning Programming Budgeting Systems (PPBS) techniques to decision making and resource allocation practices has been utilized by Federal civilian agencies under Presidential directive since 1965. The application of PPBS by the Department of Health, Education and Welfare is discussed and experimentation by the State Department is mentioned. One application of PPBS by libraries, that of the Department of Interior Libraries, to meet national needs for library service in the natural resources field, packaged a variety of factors essential to support high-level decision making. A bibliography of 17 items relating to government work on PPBS is appended. (AB)

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Application of PPB to Certain Federal Programs

by

Willard Fazar
Executive Office of the President
Bureau of the Budget

Paper presented at an Institute on Program Planning and Budgeting Systems for Libraries at Wayne State University, Detroit, Michigan, Department of Library Science, Spring 1968

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Introduction

by
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The following paper was presented at an institute on Program Planning and Budgeting Systems for Libraries, held at Wayne State University under the Higher Education Act, Title IIB, in the spring of 1968.

The intent of the institute was to introduce administrators and finance officers of large libraries, public, state, and academic to the principles and procedures of PPBS.

Each participant in the institute brought with him the most recent budget document from his own library, and with the help of the institute staff, attempted to convert it into a PPBS presentation.

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Since August 1965 when the President directed all Federal civilian agencies to undertake application of the Planning-Programming-Budgeting System, considerable but varied progress has been made. The total beneticial impact of PPB depends upon its evolutionary development and adaptation within and among many different Federal agencies. In addition, many aspects of PPB may be considered innovative. Therefore it should not be surprising to note that a wide spectrum of approaches and results have been experienced among agencies to date.

A few words on the range of experience encountered for different ingredients of the PPB system may be helpful for your understanding of the evolutionary aspects to be considered by potential users. For many organizations applications even at the bottom of most of the ranges to be cited are likely to provide benefits beyond those of traditional program decision and resource allocation practices.

-- Program structures developed range from groupings aligned to organizational or geographic structure to groupings representing substantive issues in an agency's mission.

-- Objectives identified range from general or imprecise to specific or concrete and time-phased.

-- Alternatives presented range from none or unrealistic to several that are feasible for choice.

-- Five-year projections of costs range from unrealistic, enlargements in years succeeding the budget year to quite reasonable estimates based on need and fiscal outlook.

-- Criteria and assumptions used range from their application without identification to explicit descriptive statements for the decision-maker's knowledge and consideration.

-- Quantification methods range from mere statistical inventories of facts related to a problem to the use of numbers and techniques of management science to represent the total problem and potential solution.

-- Cost-effectiveness figures range from those on inputs and outputs only for activities producing countable products and services to sophisticated ratios that include estimates of the values of much less tangible outputs.

-- Uncertainty references range from none to explicit descriptions and quantification of anticipations.

-- Program analyses, supposed to cover all of these items and more, range from broad-brush descriptions with minimal quantification to quite thorough in-depth diagnoses for the decision-maker's confidence.

Considerable literature is emerging on the application of PPBS for diagnosis and decision-making on specific programs in the civil sector of the Federal Government. A little review of some of this literature, e.g., items in the selected bibliography given below, will confirm the fact that a wide range of treatment is not only unavoidable but also necessary for the successful evolutionary application of PPB by a multitude of agencies to an infinite variety of programs. To gain the most benefit, PPB applications must be tailored to suit specific programs and problems - always remembering that "perfection is a direction, not a location."

Let us now scan a few of the many examples of applications by different agencies.

The Department of Health, Education and Welfare has produced many program analyses that indicate "top of the range" experience. To lead

you into my first example, here is the fiscal 1969 HEW program structure by program category and subcategory:

1. Education

   11 Development of Basic Skills
   12 Development of Vocational and Occupational Skills
   13 Development of Advanced Academic and Professional Skills
   14 Individual and Community Development
   15 General Research
   16 General Support

2. Health

   21 Development of Health Resources
   22 Prevention and Control of Health Problems
   23 Provision of Health Services
   24 General Support

3. Vocational Rehabilitation

   31 Rehabilitation for Disabling Conditions
   32 General Rehabilitation and General Support

4. Social Services

   41 Improving the Social Functioning for Adults
   42 Improving the Social Functioning of the Child and Family
   43 Improving the Organization and Delivery of Social Services
   44 General Development of Social Service Resources
   45 General Support

5. Income Maintenance

   51 Aged Assistance
   52 Disability Assistance
   53 Other Individual and Family Support
   54 General Support

Under subcategory 222, Prevention and Control of Health Problems, a number of Disease Control Program Analyses were conducted by HEW to examine relative costs and estimated direct benefits of specialized proposals to control specific diseases. It developed comparative data between programs to highlight such factors as number of deaths averted,

the cost-per-death-averted and the benefit/cost ratio. The analysis showed the following relationships:

BENEFIT COST DATA
SELECTED DISEASE CONTROL PROGRAMS*
($ millions) 3/

Program	1968-1972 HEW Costs 1/ (Millions) 1	1968-1972 HEW & Other Direct Costs 2/ (Millions) 2	1968-1972 Savings Direct & Indirect 2/ (Millions) 3	Benefit Ratio Cost* 4
Seat Belt Use	$ 2.2	$ 2.0	$2,728	$ 1351.4
Restraint Devices	.7	.6	681	1117.1
Pedestrian Injury	1.1	1.1	153	144.3
Motorcyclist Helmets	8.0	7.4	413	55.6
Arthritis	37.6	35.0	1,489	42.5
Reduce Driver Drinking	31.1	28.5	613	21.5
Syphilis	55.0	179.3 1/	2,993	16.7
Uterine Cervix Cancer	73.7	118.7	1,071	9.0
Lung Cancer	47.0	47.0 1/	268	5.7
Breast Cancer	17.7	22.5	101	4.5
Tuberculosis	130.0	130.0	573	4.4
Driver Licensing	6.6	6.1	23	3.8
Head and Neck Cancer	8.1	7.8	9	1.1
Colon-Rectum Cancer	7.7	7.3	4	.5

*Numbers have been rounded to a single decimal point from three decimal points; therefore ratio may not be exact result of dividing column 2 into column 3 as they appear here.

1/ Not discounted

2/ Discounted

3/ Funding shown used as basis for analysis not necessarily funding to be supported by Administration.

Here are some of the methodological problems described by HEW, in the application of PPB to the selected disease control programs, i.e., a description of the procedures used (1) to determine the lifetime earning patterns of persons whose deaths might be averted by a disease control program, and (2) decide on appropriate discount rates to use in reducing

future benefits and costs to their present values.

Lifetime Earnings Patterns

The calculation of lifetime earnings figures used in DHEW's 1966 series of disease control program analyses was based largely on methodology developed by Mrs. Dorothy P. Rice of the Office of Research and Statistics, Social Security Administration, and reported by her in Estimating the Cost of Illness.*

The appropriate measure of output loss for individuals was considered to be year-round, full-time earnings, including wages and salaries before deductions plus wage supplements such as employer contributions for social insurance and private pension and welfare funds. Unpublished mean earnings data for full-time male workers in 1964 by 5-year age intervals were furnished by the Bureau of the Census. Similar data were not available for females, but the Bureau of the Census published median incomes for year-round full-time workers by sex and age. For each age class, it was assumed that the ratio of female to male mean income was the same as the ratio of female to male median income.

Each mean earnings figure was adjusted upwards to take account of wage supplements by a factor of 1.08268, derived from data published by the Department of Commerce in Survey of Current Business.

Although a relatively high proportion of females are housewives and not in the labor market, it was considered desirable to impute a value to their services. For this purpose the 1964 mean earnings of domestic servants, or $2,767, was used. It was recognized that the imputed value was "clearly on the low side," for it made no allowance for the housewife's longer work week and took no account of the size of the household cared for.

The following table presents 1964 mean earnings by age class, adjusted for wage supplements and including an imputed value for housewives' services.

*Health Economics Series No. 6, Public Health Service Publication No. 947-6, May 1966.

Table A
Adjusted Mean Earnings by Age and Sex, 1964

Age Group	Male	Female
14-19	$ 2,829	$ 3,387
20-24	4,634	3,800
25-29	6,373	3,951
30-34	7,532	4,670
35-39	7,953	4,390
40-44	8,305	4,584
45-49	8,229	4,724
50-54	7,435	4,268
55-59	7,174	4,355
60-64	7,113	4,318
65-69	5,981	3,851
70 and over	5,887	3,790

Although Table A presents only cross-sectional data for a single year, 1964, it was assumed that it could also be used to represent the earnings pattern of an average individual over his working lifetime. In other words, an average 20-year-old male in the labor force could expect to earn $4,634 on the average for full-time work over the next five years, $6,373 for the five years after that, and so forth. It was recognized that this assumption might result in a downward bias in the estimate of discounted lifetime earnings because other data indicated that younger workers appeared to benefit more from economic growth than older workers. The evidence for this bias was considered inconclusive, however.

In convertin the estimated mean earnings by year into lifetime earnings, several other factors had to be considered.

First, not everyone would have been working or productive had death from the cause under study ~~not~~ interfered. Some victims of fatal accidents would have been too old or too young or unwilling or unable to find a job. For the purpose of the disease control program analyses, it was assumed that if it were not for these illnesses or causes of death, persons stricken would have had the same employment experience as persons in the same age and sex groups. Accordingly, the 1964 labor force participation rates (proportion of all civilians who were employed or looking for a job) were applied, and further adjustments were made for the number who would have been employed under conditions of full employment, defined as 4-percent unemployment. The unemployment rates for 1965 were used because 1965 was the most current year of full employment. Without the assumption of full employment, losses due to mortality and disability could not have been isolated from losses due to unemployment.

Table B below presents the data used for these adjustments.

Table B
Labor Force Participation and Unemployment Rates
by Age Class

Age Group	1964 labor force participation rates		1965 unemployment rates	
	Male	Female	Male	Female
14	17.7	9.9	6.8	5.2
15-19	44.8	31.9	13.7	14.8
20-24	85.6	49.1	6.3	7.3
25-29	94.7	37.9	3.3	5.7
30-34	96.4	36.2	2.6	5.2
35-39	95.8	41.7	2.6	4.8
40-44	95.4	47.7	2.5	4.4
45-49	95.2	51.4	2.5	3.6
50-54	93.3	50.5	2.6	2.8
55-59	89.6	45.9	3.2	2.9
60-64	77.4	32.7	3.4	2.7
65-69	41.7	17.2	4.2	3.1
70 and over	18.7	5.8	2.7	2.4

The second factor which had to be considered was mortality from causes other than the one under study. Even if a 16-year old motorcyclist is saved from fatal injury, he may succumb to some other cause before reaching normal retirement. To handle this factor, standard actuarial techniques were used; that is, mortality records were used to determine the proportion of males (females) of age a surviving to age n, and this proportion was then applied to the earnings in year n (adjusted as previously discussed) of any such male whose accidental death was prevented at age a.

The Discount Rate

Program Analysis 1966-1 stated that,

> "Although there is agreement among economists that comparison of streams of earnings over varying time spans should employ the process of discounting, there is no agreement on the discount rate to be used. For purposes of this cost-benefit analysis, a basic discount rate of 6 percent is used."

The basic discount rate was then adjusted to reflect anticipated differential changes in prices. Over the ten-year period 1955-65, for example, medical care prices increased at a rate of approximately 2% per year faster than consumer prices. It was assumed that this differential rate of increase would continue and that it would apply to program costs as well. To convert the program costs given in Exhibit 1 into terms comparable to consumer prices, therefore, the costs given should be increased by a factor of 2% per year

before discounting. Essentially the same result would be obtained by subtracting the 2% from the basic discount rate of 6%, given an adjusted rate of 4% for discounting program costs.

In the case of lifetime earnings, it was assumed that worker productivity would continue to increase at a rate of about 3% per year as it had on the average from 1947 to 1965 and that wages would grow with productivity. The effect of increasing wages was taken into account by subtracting this 3% from the basic discount rate, giving an adjusted rate of 3% for discounting lifetime earnings.

An example of experimentation in the State Department to design and implement a truly innovative system for PPB application merits at least a briefing here. It is a system for quantifying the "unquantifiable." It is introduced in a paper, an Application of Computers to the Planning of Educational and Cultural Exchange Programs, by David L. Osborn of the State Department's Bureau of Educational and Cultural Affairs, April 26,1966.

In regard to the application of PPB by libraries, I know of only one Federal library system that has conducted PPB analysis to advance its role in the program choices and resource allocations of its establishment. This program or systems analysis was led by Erik Bromberg, Director of Libraries for the Department of the Interior. The impact of Bromberg's study was the recent authorization to develop a National Library of Natural Resources -- to meet the national needs for library service in the natural resources field. This field covers many academic disciplines, including engineering, mining, meteorology, hydrology, biology, oceanography, ecology, metallurgy, geology, aquatic resources, and archeology.

This analysis packaged a variety of factors essential to support high-level decision-making on the subject by the Secretary of Interior, the Bureau of the Budget and the Congress. It included sections on National needs, objectives and goals, proposed program and alternatives, and

expected benefits. The following paragraph of the study exemplifies some of the research that was necessary for comprehensive diagnosis:

> "One study 1/ indicates that failure to have access to pertinent literature at the time a problem is under study resulted in a loss of 10% of all funds invested in research. Projected to Interior this loss rate would indicate a potential loss of $ _____ by failure to provide proper literature backup in current research programs. Another comprehensive study made of dollar support of technical information in industry was completed in 1958. 2/ Projected to 1968, it indicates that industry is spending for technical information support $750 annually per scientist-engineer. At industry rate our _____ personnel in the scientific and technical field would require an information budget of $ _____. That scientists and engineers recognize the value of up-to-date literature and are eager to use it is indicated by Bonneville Power Administration's experiences with a Selective Dissemination of Information program inaugurated on July 1, 1966. When informed of the exact kinds and quantities of available, pertinent literature in their field, engineers demanded it in such quantities that interlibrary loan requests went up 30% in one year and requests for library reference materials trebeled."

Some of the specific items presented and quantified in Bromberg's program analysis can be cited as follows:

-- Current collection deficiencies and proposed acquisitions in fiscal 1970 for foreign books, english books, serials, theses, gifts and exchanges, and bindings

-- Long-range goals for services under interlibrary loans, field technical inquiries, translations, and referral service.

-- Machine applications related to book catalog, periodical catalog, and natural resources bibliography.

-- Costs and times for achievement of objectives through alternate funding levels.

1/ John Martyn, "Unintentional Duplication of Research," New Scientists, (February 6, 1964), p. 338.

2/ William T. Knox, et al., "Administration of Technical Information Groups," Industrial and Engineering Chemistry, 51, 48A-61A, 1959.

-- Annual estimates of costs from fiscal 1970 through 1974 for the proposed program and for three alternate programs by major cost categories, i.e., for collections, services, machine applications, staffing, etc.

Despite the innumberable problems encountered by Bromberg and the many difficult questions raised ("What is the dollar value of one bit of information?"), I hope that the success of this PPB application in the library field of the Department of the Interior will foster comparable effort for the libraries of your individual concern and interest.

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